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J.S. Army Toxic and Hazardous Materials Agency

Enhanced Preliminary Assessment Report:

Worth Army Housing Units
Worth, Illinois

November 1989

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prepared for

Commander

U.S. Army Toxic and Hazardous Materials Agency
Aberdeen Proving Ground, Maryland 21010-5401

prepared by

Environmental Research Division
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SUMMARY

The Worth housing area located in Worth, Ill., presents no imminent or substantial threat to human health or the environment. There is no evidence to suggest that hazardous or toxic constituents have ever been released from this property. No immediate remedial actions, therefore, are warranted for the site.

Although these housing units were originally developed in support of a Nike missile battery, all available documentation and circumstantial evidence suggest that the housing property was wholly independent of the battery's operational activities. No Nike-related wastes were delivered to this property for management or disposal. Furthermore, since this property was independent of the missile operations with respect to all necessary utilities, there is no possibility of Nike-related wastes migrating to the housing area along buried utility lines.

The following action is recommended prior to release of this property: sample the Army-owned electrical transformers on the property for the presence of polychlorinated biphenyls (PCBs) and label the tested transformers in accordance with the applicable regulations.

This recommendation assumes that the property will most likely continue to be used for residential housing.

1 INTRODUCTION

In October 1988, Congress passed the Defense Authorization Amendments and Base Closure and Realignment Act, Public Law 100-526. This legislation provided the framework for making decisions about military base closures and realignments. The overall objective of the legislation is to close and realign bases so as to maximize savings without impairing the Army's overall military mission. In December 1988, the Defense Secretary's ad hoc Commission on Base Realignment and Closure issued its final report nominating candidate installations. The Commission's recommendations, subsequently approved by Congress, affect 111 Army installations, of which 81 are to be closed. Among the affected installations are 53 military housing areas, including the Worth housing area addressed in this preliminary assessment.¹

Legislative directives require that all base closures and realignments be performed in accordance with applicable provisions of the National Environmental Policy Act (NEPA). As a result, NEPA documentation is being prepared for all properties scheduled to be closed or realigned. The newly formed Base Closure Division of the U.S. Army Toxic and Hazardous Materials Agency is responsible for supervising the preliminary assessment effort for all affected properties. These USATHAMA assessments will subsequently be incorporated into the NEPA documentation being prepared for the properties.

This document is a report of the enhanced preliminary assessment (PA) conducted by Argonne National Laboratory (ANL) at the Army stand-alone housing area in Worth, Ill.

1.1 AUTHORITY FOR THE PA

The USATHAMA has engaged ANL to support the Base Closure Program by assessing the environmental quality of the installations proposed for closure or realignment. Preliminary assessments are being conducted under the authority of the Defense Department's Installation Restoration Program (IRP); the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), Public Law 91-510, also known as Superfund; the Superfund Amendments and Reauthorization Act of 1986, Public Law 99-499; and the Defense Authorization Amendments and Base Closure and Realignment Act of 1988, Public Law 100-526.

In conducting preliminary assessments, ANL has followed the methodologies and procedures outlined in Phase I of the IRP. Consequently, this PA addresses all documented or suspected incidents of actual or potential release of hazardous or toxic constituents to the environment.

In addition, this PA is "enhanced" to cover topics not normally addressed in a Phase I preliminary assessment. Specifically, this assessment considers and evaluates the following topical areas and issues:

- Status with respect to regulatory compliance,
- Asbestos,
- Polychlorinated biphenyls (PCBs),
- Radon hazards (to be assessed and reported on independently),
- Underground storage tanks, *How the tank is used, how it is maintained, etc.*
- Current or potential restraints on facility utilization,
- Environmental issues requiring resolution,
- Health-risk perspectives associated with residential land use, and
- Other environmental concerns that might present impediments to the expeditious "excessing," or transfer and/or release, of federally owned property.

1.2 OBJECTIVES

This enhanced PA is based on existing information from Army housing records of initial property acquisition, initial construction, and major renovations and remodeling performed by local contractors or by the Army Corps of Engineers. The PA effort does not include the generation of new data. The objectives of the PA include:

- Identifying and characterizing all environmentally significant operations (ESOs),
- Identifying property areas or ESOs that may require a site investigation,
- Identifying ESOs or areas of environmental contamination that may require immediate remedial action,
- Identifying other actions that may be necessary to address and resolve all identified environmental problems, and
- Identifying other environmental concerns that may present impediments to the expeditious transfer of this property.

1.3 PROCEDURES

The PA began with a review of Army Housing records² located at the Directorate of Engineering and Housing (DEH) at Fort Sheridan, Ill., on August 22, 1989. This was followed, on the same day, by a visit and general inspection of the Worth housing area.³ At the time of the site visit, the interior of an unoccupied housing unit was inspected and photographs were taken of the housing units and surrounding properties as a means of documenting the condition of the housing units and immediate land uses. Site photographs are appended. Additional information was obtained in a followup meeting with DEH personnel on September 1, 1989, and in telephone conversations on September 5 and 14, 1989.⁴

All available information was evaluated with respect to actual or potential releases to air, soil, and surface and ground waters.

Access to individual unoccupied housing units was obtained through DEH personnel at Fort Sheridan.

2 PROPERTY CHARACTERIZATION

2.1 GENERAL PROPERTY INFORMATION

The Worth housing area is located in the town of Worth, Cook County, Illinois. The town is a southwestern suburb of Chicago with a population of 11,592.⁵ Figures 1 and 2 show the general location of the facility.

The area consists of 7.4 acres of land leased from the Chicago Metropolitan Sanitary District for a term of 55 years, beginning November 25, 1956, and ending October 14, 2011.⁶ The housing units were constructed in 1958.² No additional permanent structures have been constructed on the property since that time. The DEH is responsible for major renovations or upgrading within the facility.

2.2 DESCRIPTION OF FACILITY

Figure 3 presents the site plan of the housing property.

Housing Units

The Worth housing area consists of 12 "Capehart"-style houses. Capehart is the model name assigned by the builder, National Homes. These wood-frame houses are built on concrete slabs. Water lines and air-conditioning ducts are embedded in the foundation slab. There are seven three-bedroom units and five two-bedroom units. Each unit has a car parking area in the front and a storage shed at the rear.

Utilities

Since 1988, the housing units have been supplied with city water from Palos Heights.⁴ Prior to this time, water was pumped from a well on-site and distributed to the houses. The well, no longer in use, is capped off, but has not been sealed.³ Electricity is supplied by the Commonwealth Edison Company.⁴ The transformers on-site are owned by the Army and maintained by the DEH at Fort Sheridan.³

Sewage and Solid Wastes

Sewage from the houses is removed through underground lines linked to the Palos Heights city sewer system.⁴

Real property records show an on-site sewer/water treatment plant, including a building (121 square feet in area) complete with an Imhoff tank and filter bed (3,074.5 square feet in area).² There is no documentation available regarding the past use of this facility or its abandonment and decommissioning. The building is still on the property.³ DEH personnel state that they are not aware of any past use of the on-site sewer/water treatment facility.⁴

FIGURE 1 Location Map of Illinois Army Housing Facilities

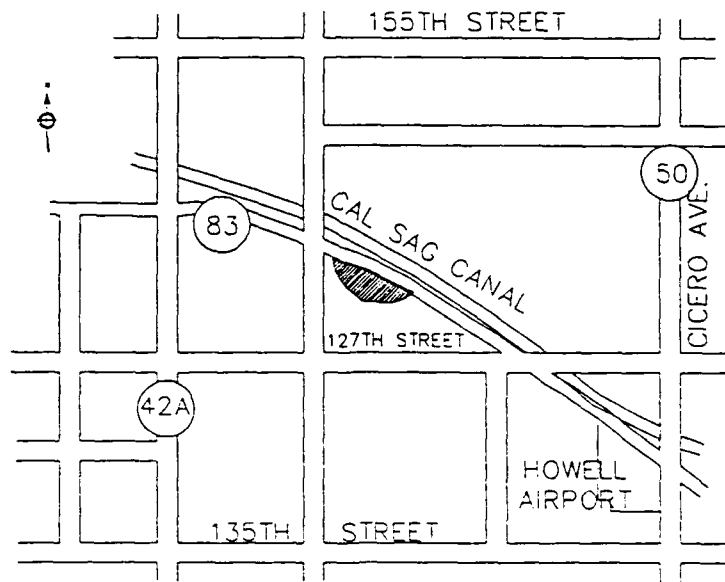


FIGURE 2 Vicinity Map of Worth Army Housing Units

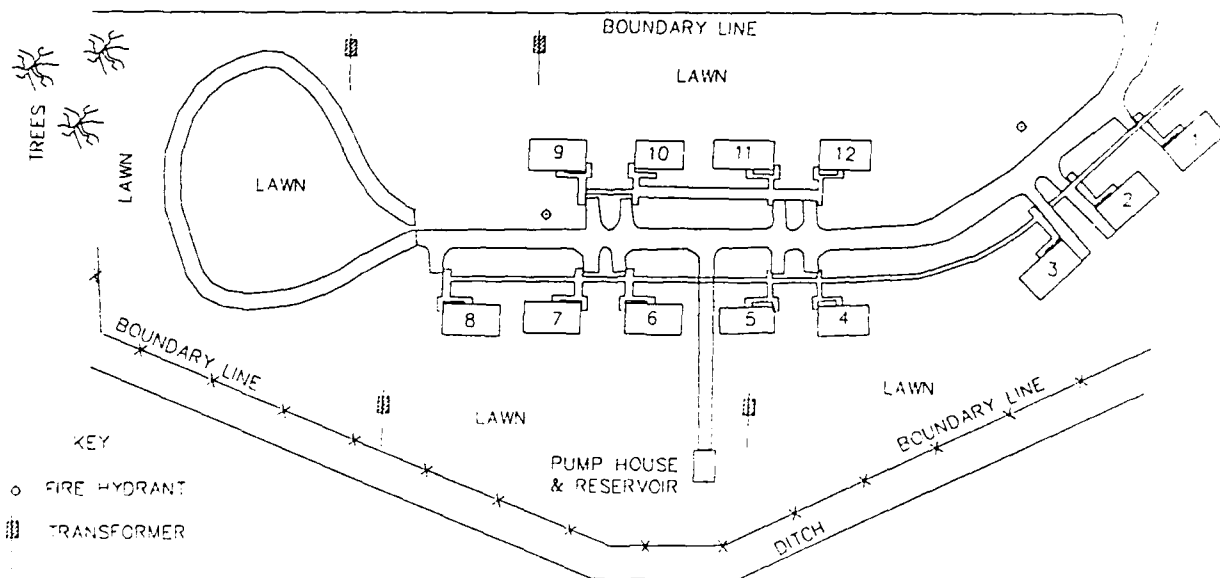


FIGURE 3 Site Plan Map of Worth Army Housing Units

Solid waste (garbage) is collected and disposed of by H and R Disposal Service, a private contractor.⁴ Containers for collecting the waste are kept on the front side of the houses and belong to the contractor.⁴

Fuel Storage

Liquified propane gas (LPG), stored in 124-gallon steel tanks and supplied by the Petrolane Gas Service Company of Lockport, Ill., has been used as fuel for indirect heating since October 1988.⁴ The tanks are located at the fronts of the houses³ and are the property of the company.

Prior to 1988, oil was used as fuel. The oil was stored in above-ground tanks of 275-gallon capacity. These tanks have been decommissioned and removed from the site.⁴

Storm Drainage Systems

The property is drained by open ditches and/or surface runoff through culverts, into an unnamed creek that runs along the southwest side of the property.

Other Permanent Structures or Property Improvements

In addition to the 12 housing units, there are two permanent structures on the property. One of the structures contains the capped well and the pump system (583 square feet in area), and the other is a small wastewater treatment facility (121 square feet). Neither of the buildings is currently used, and each is kept locked.³

2.3 PROPERTY HISTORY

2.3.1 Nike Defense Program and Typical Battery-Level Practices

Generic information on the national Nike antiaircraft defense program has been compiled in two studies, one commissioned by the Army Corps of Engineers⁷ and the other by the U.S. Army Toxic and Hazardous Materials Agency.⁸ In both studies, independent contractors relied on information contained in unclassified documents related to the Nike surface-to-air missile program, including engineering drawings and specifications (for the facilities and the missiles themselves), interviews with Army personnel participating in the Nike program, and operations manuals and directives relating to the operations and maintenance of Nike facilities. Taken together, these two reports represent the most complete assemblage of generic information on the Nike missile program from an environmental perspective. Salient points from both reports are condensed below.

At its zenith in the early 1960s, the Nike program included 291 batteries located throughout the continental United States. The program was completely phased out by 1976, with many of the properties sold to private concerns or exceded to state or local governments for nominal fees.

Nike Ajax missiles were first deployed in 1954 at installations throughout the continental United States, replacing, or in some cases augmenting, conventional artillery batteries and providing protection from aerial attack for strategic resources and population centers. Typically, Nike batteries were located in rural areas encircling the protected area. The Ajax was a two-stage missile using a solid-fuel booster rocket and a liquid-fuel sustainer motor to deliver a warhead to airborne targets.

The Ajax missile was gradually replaced by the Nike Hercules missile, introduced in 1958. Like the Ajax, the Hercules was a two-stage missile, but it differed from the Ajax in that its second stage was a solid-fuel rather than liquid-fuel power source and its payload often was a nuclear rather than conventional warhead. Ajax-to-Hercules conversions occurred between 1958 and 1961 and required little change in existing Nike battery facilities. A third-generation missile, the Zeus, was phased out during development and consequently was never deployed.

A typical Nike missile battery consisted of two distinct and separate operating units, the launch operations and the integrated fire control (IFC) operations. The two operating areas were separated by distances of less than two miles, with lines of sight between them for communications purposes. A third separate area was also sometimes part of the battery. This area was typically equidistant from the two battery operating sites and contained housing for married personnel assigned to the battery. Occasionally, these housing areas also contained battalion headquarters, which were responsible for a number of Nike batteries.

Depending on area characteristics and convenience, the housing areas were often reliant on the launch or IFC sites for utilities such as potable water, electrical power, and sewage treatment. In those instances, buried utility lines connected the housing area to one or both of the other battery properties. It is also possible, however, that housing areas were completely independent of the missile launcher and tracking operations. In those instances, the necessary utilities were either maintained on the housing site or purchased from the local community. In many localities, as the character of the land area around the housing units changed from rural to suburban or urban, communities extended utility services to the housing unit locations, in which case conversions from independent systems to community systems were made.

A large variety of wastes was associated with the operation and maintenance of Nike missile batteries. Normally encountered wastes included benzene, carbon tetrachloride, chromium and lead (contained in paints and protective coatings), petroleum hydrocarbons, perchloroethylene, toluene, 1,1,1-trichloroethane, 1,1,2-trichloroethane, and trichloroethylene. Because of the rural locations of these batteries, and also because very few regulatory controls existed at that time, most of these wastes were managed "on-site." (Unused rocket propellants and explosives, however, would always have been returned to central supply depots and not disposed of on-site.) It is further conceivable that wastes generated at one of the Nike properties may have been transferred to its companion property for management or disposal.

Wastes related to missile operation and maintenance would not have been purposely transferred from a battery operating area to a housing area with no facilities for waste management or disposal. In some instances, however, the sewage treatment facilities for all Nike battery properties were located at the housing area; that possibility cannot be automatically ignored. Finally, where housing areas received various utilities from either of the operating areas, it is also possible that wastes disposed of on those other properties may have migrated to the housing area via the buried utility lines. And since decommissioning of the Nike batteries did not normally involve removal of buried utility or communication lines, any such contaminant migration is likely to have gone unnoticed.

2.3.2 Worth Housing Units

The Worth housing area was developed in 1958 to provide stand-alone family housing for military personnel assigned to the Arlington Heights Nike battery. Despite its affiliation with the Nike battery site, the Worth housing area was independent of the battery with respect to all utilities and services. Twelve single-family houses were erected on the property. Other property improvements, also dating from 1958, are a building containing a wastewater-treatment facility and another containing a potable water well pump and water softening plant. Neither of the two buildings is currently used. The well has been capped but not sealed.

Since the property's development in 1958, no other permanent structures have been added. However, renovations and improvements include new roofs, floor tiles (in most of the units), insulation for attics (fiberglass), windows, and venetian blinds; upgrading of bathrooms; air-conditioning of homes; and new water and sewer lines connecting the houses to the Palos Heights city systems.² More recent improvement was the installation of new furnaces,² which use LPG as fuel. The use of fuel oil has been discontinued, and former oil-storage tanks have been decommissioned and removed from the site.

2.4 ENVIRONMENTAL SETTING AND SURROUNDING LAND USE

Worth is a southwestern suburb of Chicago, located about 20 miles from the city. Other residential properties surround the housing area. A creek runs along the southwestern border of the property. On the northern side and across Illinois Rt. 83 is the Cal-Sag Canal. In the southeastern direction, an unused airport is reportedly being converted to a shopping mall. The housing area is not known to be in a floodplain.

2.5 GEOLOGIC AND HYDROLOGIC SETTINGS

The geologic and hydrologic settings of the Chicago area, in which the town of Worth is located, are described in two reports prepared by the Illinois State Geological Survey.^{9,10} The Chicago area is located in northeastern Illinois on a broad, gently sloping arch of the Paleozoic bedrock formations. Glacial deposits overlie the bedrock

and constitute the surface. The major features of the surface are thus depositional in character -- moraines, outwash plains, valley trains, filled lake basins, and sand dunes.

The glacial deposits in the Chicago area are almost entirely Wisconsinian in age. Deposits from Illinoian and Kansan glaciation are evident only in areas west of the area. Glacial deposits in the area are about 100 feet thick on average and are part of the Wadsworth Till Member of the Wedron Formation. The gray clayey till of the glacial deposits occurs mixed with the older rocks and black shale of Mississippian and Devonian ages. Overlying the glacial drift is a thin deposit of wind-blown silt called loess. Although the maximum thickness of the loess is only a few feet, it is easily distinguished from the till below. "Modern soil" still in the process of formation lies at the very top of the surface.

The bedrock unit immediately underlying the glacial deposits is mainly Silurian dolomite (395 to 400 million years old), deposited from a shallow interior sea. Rocks of a younger age, belonging to Devonian, Mississippian, and Pennsylvanian ages, are seen in regions surrounding the Chicago area and also inside the area in the fault blocks of the Des Plaines Disturbance. Silurian dolomite has a maximum thickness of about 500 feet in the southeastern part of the Chicago area.

The Ordovician rocks (430 to 500 million years old) form the next oldest layer. These rocks were also deposited in shallow seas and are divided into three major series, all of which occur in the Chicago area. The lower Canadian Series is largely dolomite but contains some sandstone. The middle Champlainian Series is largely dolomite and limestone and has a prominent sandstone at the base. The upper Cincinnati Series is largely shale and contains some limestone. The thickness of the Ordovician strata ranges from 700 to 1,100 feet.

The rocks of the Cambrian age (500 to 570 million years old) lie below the Ordovician rocks. The lower half of the Cambrian rocks is part of the Mt. Simon and Eau Claire formations and consists largely of sandstone. The upper half is dolomite, sandy dolomite, sandstone, and siltstone, and is part of the Ironton-Galesville Series and upwards. The thickness of these deposits is estimated to be between 3,000 and 4,000 feet, nearly twice the thickness of all younger strata.

Crystalline, pre-Cambrian rocks are granitic and form the bottommost unit. In the Chicago downtown area, these rocks occur at a depth of 4,500 feet.

Four major aquifer systems, separated on the basis of the hydrologic properties of sources and recharge, are present in northeastern Illinois. These include a glacial-drift aquifer system, a shallow-bedrock aquifer system, and two deep-bedrock aquifer systems.

The glacial-drift aquifer system is restricted to the unconsolidated material overlying the bedrock. Its major component of recharge to this system is local precipitation.

The shallow-bedrock system is formed by those bedrock units that are recharged locally from precipitation. This system consists of Silurian dolomite, and shale and

dolomites of the Maquoketa Group. The latter separates the Silurian aquifer from the deep bedrock aquifers. Nonetheless, appreciable downward leakage occurs through the Maquoketa Group.

The two deep-bedrock aquifer systems are the Cambrian-Ordovician system and the Mt. Simon system. The major aquifers in the deep systems are the Glenwood-St. Peter, Iron-ton-Galesville, and Mt. Simon sandstones. However, other beds in the systems also contribute water at some locations. Recharge to the deep units is mostly from areas west and north of the six-county Chicago metropolitan area, where the rocks crop out at the surface or lie immediately below the glacial drift. Other recharge is contributed by leakage downward through the shallow bedrock aquifer system, as previously mentioned.

The Worth housing facility obtains water from Palos Heights, which in turn obtains drinking water from Lake Michigan. Prior to 1988, water to the housing units was supplied from an on-site well. The well water supply was discontinued primarily because of problems associated with softening the hard water. It is unlikely that the operation and maintenance of the Worth housing facility (since 1958) would have resulted in contamination of the groundwater. The well is capped off.

3 ENVIRONMENTALLY SIGNIFICANT OPERATIONS

3.1 ASBESTOS CONSTRUCTION MATERIALS

Housing officials report that no asbestos-containing insulation materials were used in construction of the houses. Inspection of an unoccupied unit during the site visit confirmed the absence of asbestos-containing insulation on water pipes and elsewhere in the house.

Original floor tiles may have contained asbestos. However, most of these tiles have been replaced, and there are no reports of deterioration of the original tiles which are still in service.

3.2 ABOVE-GROUND TANKS

Each housing unit was originally equipped with a 275-gallon above-ground fuel-oil storage tank. These tanks were in service from 1958 until 1988. The tanks were removed coincident with replacement of the original oil-fired furnaces with natural gas-fired furnaces. However, natural gas connections have not yet been made to the houses. LPG has been installed as an interim fuel. No problems with the above-ground tanks have ever been documented. Inspections of the former tank locations (behind each unit) showed no evidence of spills or leaks from any of the above-ground tanks.

3.3 PCB MATERIALS

The Army-owned electrical transformers located on the property have never been tested for PCBs. However, there was no evidence of spills or leaks from any of the transformers.

3.4 POTABLE WATER SUPPLY

The on-site potable water well was abandoned in favor of the city water supply system in 1988, mainly because of water softening problems associated with the hard water delivered by the well. Reportedly, there were no hazardous chemical contaminants in the well water. However, no water analysis data were found to substantiate this claim.

3.5 SEWAGE TREATMENT FACILITY

The property has an independent sewage/water treatment facility apparently constructed at the same time as the houses. However, there are no records of the plant's operation or details of its abandonment in favor of the Palos Heights municipal sewage system. The date of connection to the Palos Heights sewage system is also unknown.

4 KNOWN AND SUSPECTED RELEASES

No major releases or impacts on the environment have occurred at the Worth housing area. No hazardous wastes or hazardous materials were stored on-site or released from the site.

There is no evidence of releases from any of the above-ground fuel-oil storage tanks which had been in service on the property until 1988.

The Army-owned electrical transformers on-site may contain PCBs. However, no spills or leaks from any of these transformers were observed.

No asbestos-containing insulation is present on water pipes in the units. Original floor tiles which may have contained asbestos have been replaced in the majority of the units. No problems have been noted with the original floor tiles which still remain in service.

The on-site potable water well has been abandoned, ostensibly because of difficulties in softening the naturally hard groundwater to acceptable levels. There have been no reports of chemical contamination of groundwater recovered from this well. No confirmatory analytical results are available, however.

There is an on-site sewage treatment facility that may have been operative in the early years of the housing area's use. No details of the use or abandonment of this system could be located, but no problems are suspected.

5 PRELIMINARY ASSESSMENT CONCLUSIONS

Although this property was originally developed as part of a Nike missile battery located in Arlington Heights, Ill., no wastes associated with the operation or maintenance of the battery were ever delivered to or managed at this housing property. Furthermore, the housing facility was completely independent of the battery's missile-launch and fire-control operations with respect to water, sewer, and electrical utilities. No documentary evidence was found of utility connections between this housing site and the other properties composing the Arlington Heights Nike missile battery, many miles distant. The operations at the housing property have not affected the environment adversely.

The Army-owned electrical transformers have not been tested for PCBs. No spills or leaks have been observed, however.

Asbestos or asbestos-related products were evidently not used in the houses except for the original floor tiles still present in a few of the units. These tiles are in good condition.

It is not known whether the on-site sewer/water treatment facility (Imhoff tank and filter bed) was ever used. No sewage problems have been documented.

The above-ground fuel-oil storage tanks appear to have functioned well with no apparent leaks, but this information is not recorded. Apparently, the tanks were taken out of service with the intention of obtaining natural gas as fuel, from a public utility. In 1988, new furnaces were installed in the houses to burn natural gas. However, the plan to install new supply lines for natural gas was not implemented, pending the outcome of the Army Base Closure studies. In the interim, propane is being used as fuel.

The water supply from the on-site well was replaced by the city water supply system, primarily because of problems associated with the softening process for the hard well water. Presumably, chemical impurities were not present in the well water. Again, there are no records documenting the sampling of the well water. Because the well is not sealed off, it is possible to begin using the well water in the future.

6 RECOMMENDATIONS

The Worth housing area presents no imminent or substantial threat to human health or the environment. There is no evidence to suggest that hazardous or toxic constituents have ever been released from this property. No immediate remedial actions, therefore, are warranted.

Nevertheless, one action is recommended prior to release of this property: because the electrical transformers are owned by the Army, it is recommended that they be tested for PCBs and labeled in accordance with applicable regulations.¹¹

This recommendation assumes that the property will most likely continue to be used for residential housing.

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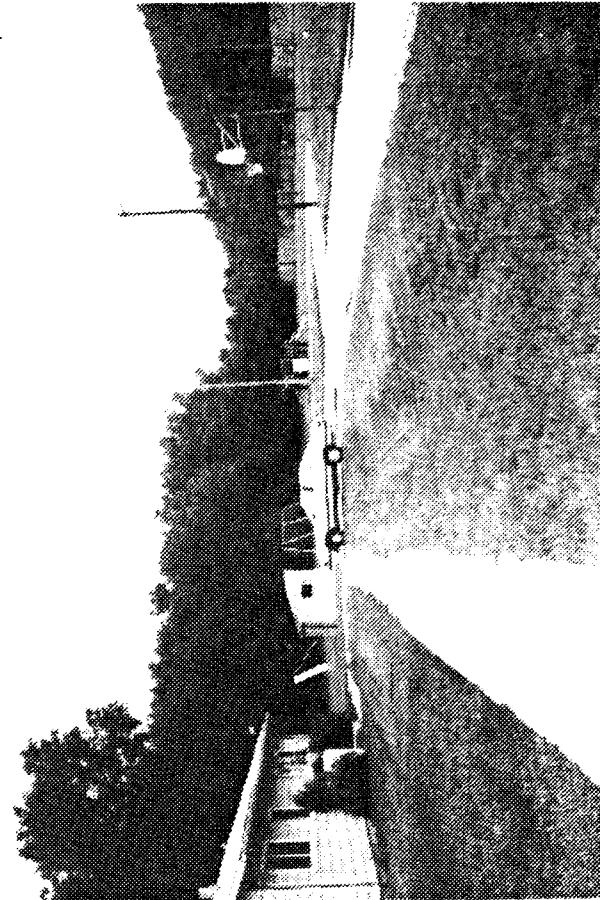
APPENDIX:
PHOTOGRAPHS OF WORTH HOUSING FACILITY
AND SURROUNDING LAND



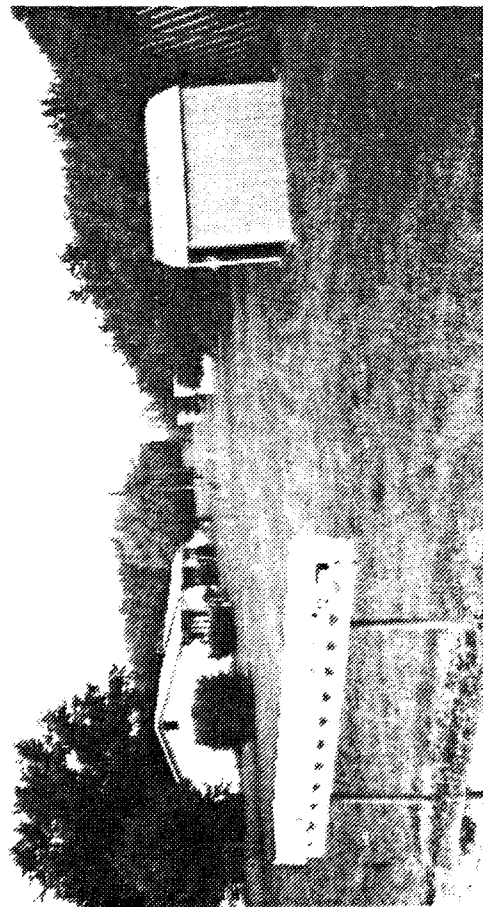
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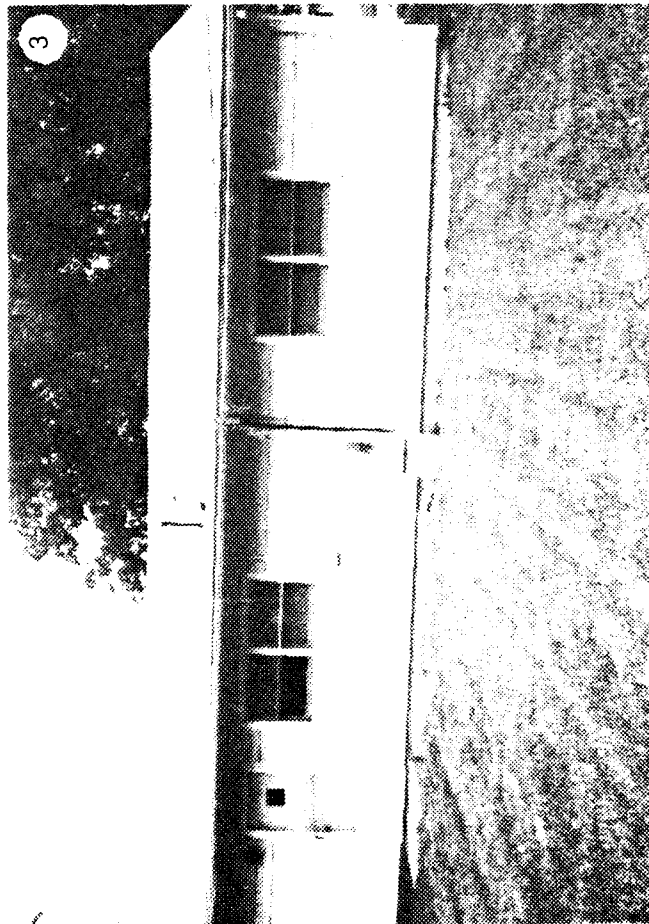
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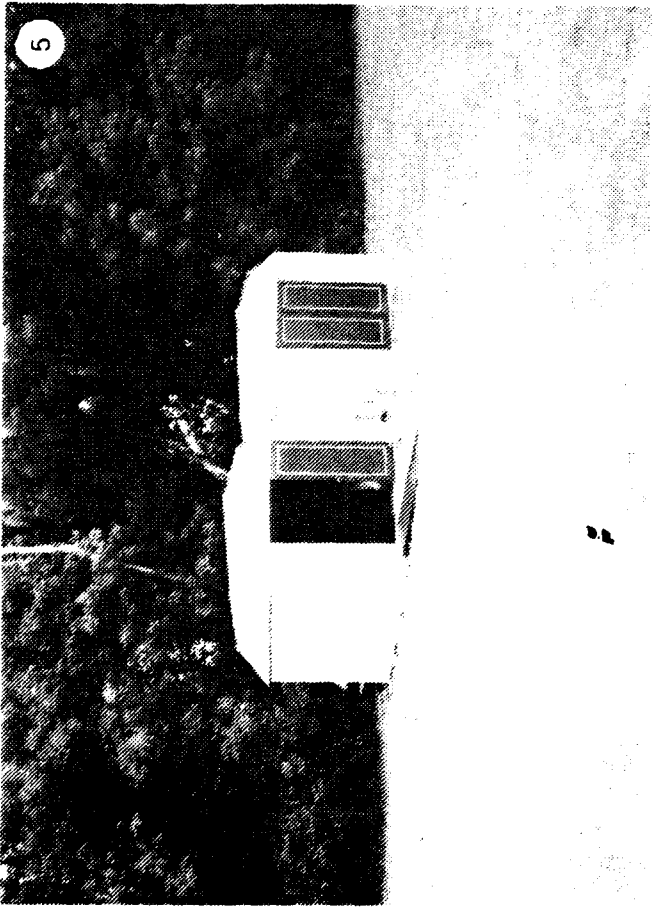
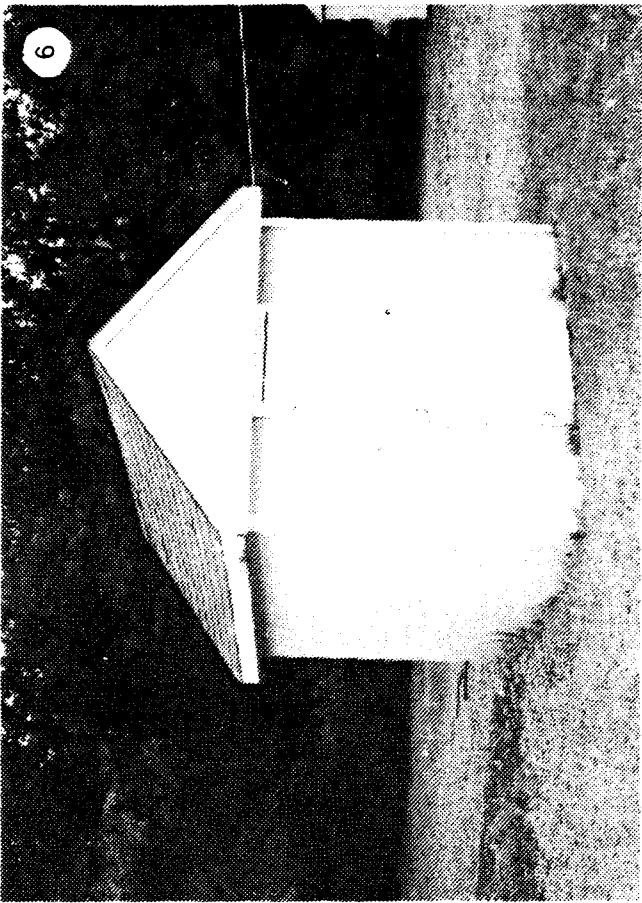
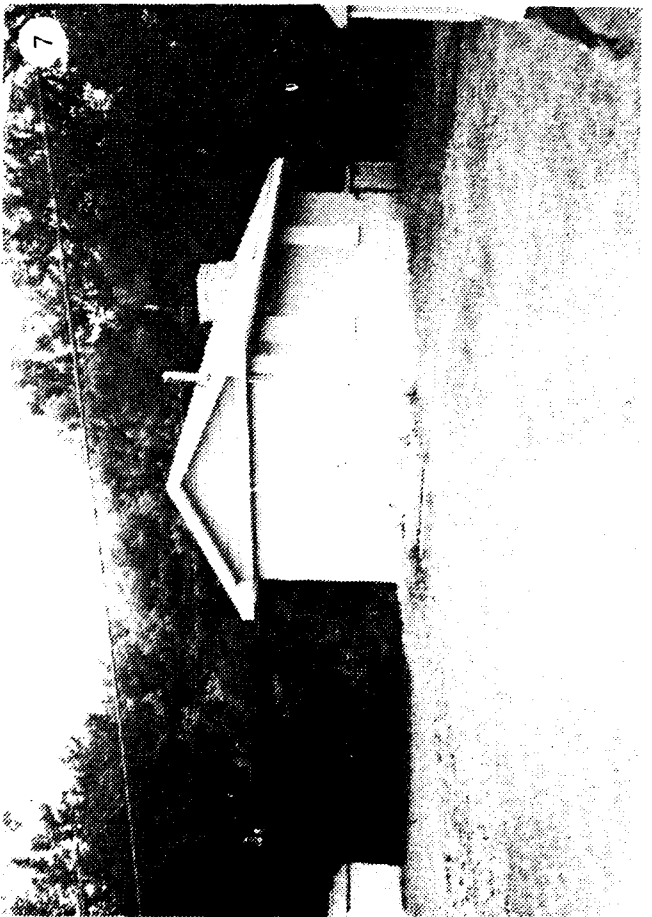
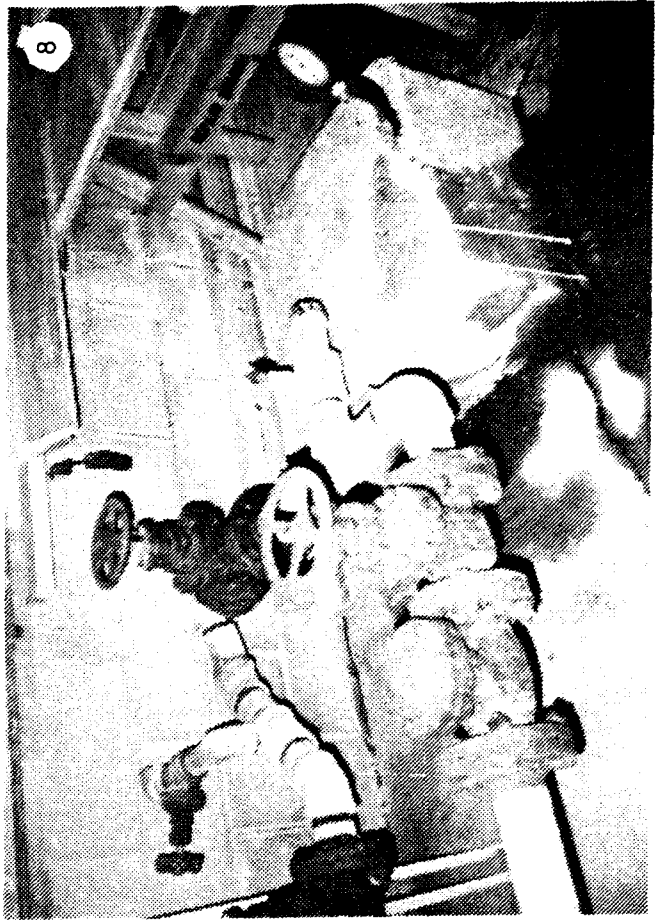


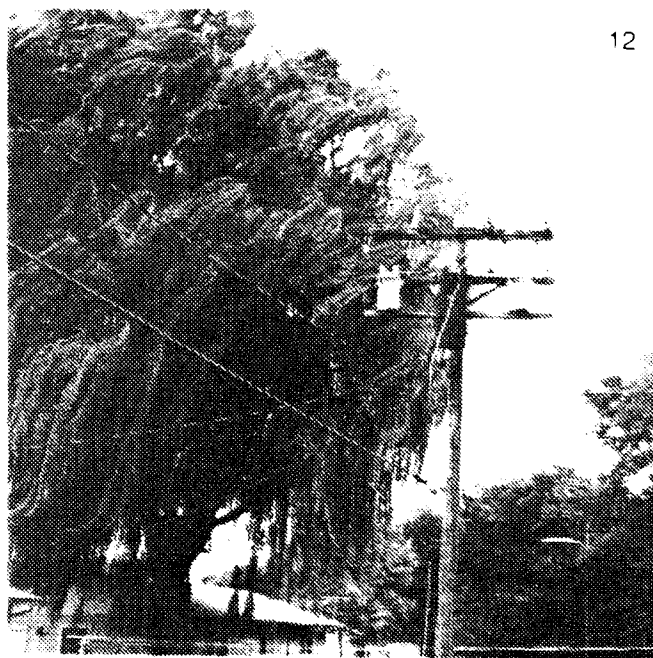
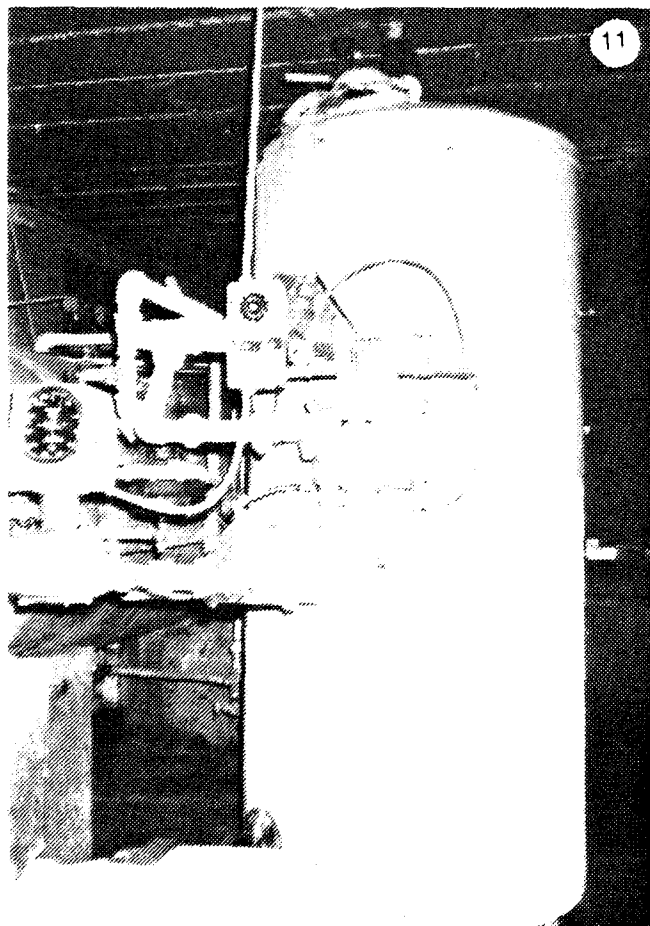
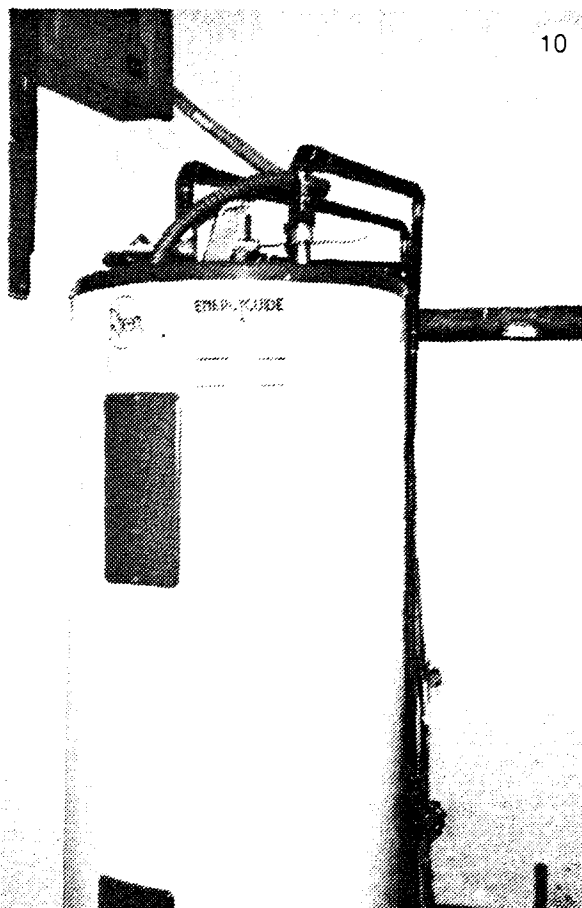
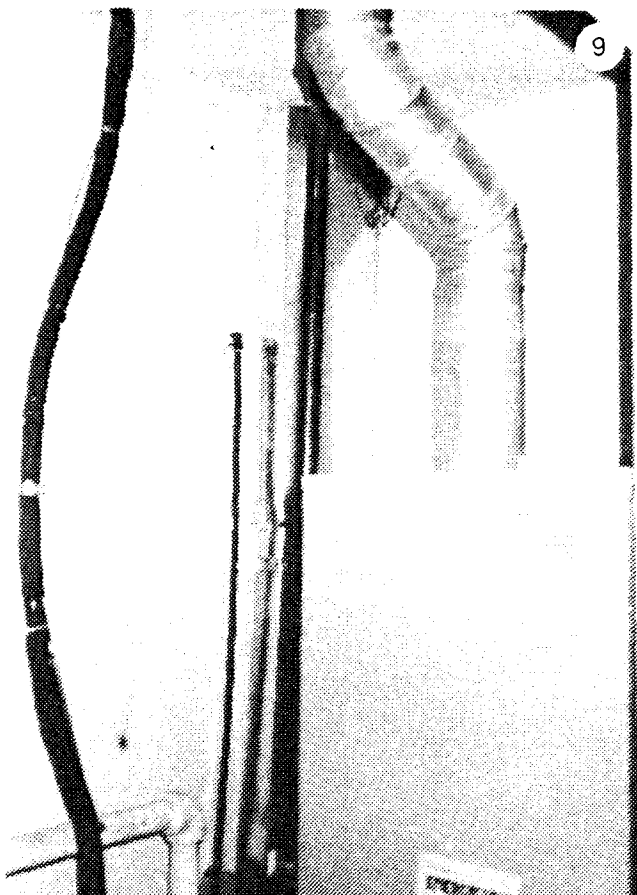
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IDENTIFICATIONS OF PHOTOGRAPHS

1. A view from the entrance to the housing area, looking west; mail boxes near the entrance, a row of houses at left, a row of storage sheds at right.
2. Front view of a house; the cylindrical white tank in front contains liquid propane fuel; no oil-storage tanks exist at the facility; a portion of the solid waste collection container can be seen at the bottom right.
3. The rear of a house.
4. At west end of the property are a playground for children and a bus shelter, both of them showing behind the parked car here.
5. Storage sheds behind the houses (on the south end of the property).
6. A small locked building presumably used for storage; this building may be identified as the sewage water-treatment plant building from the real property records; however, information gathered from Army officials indicates that this housing area was always connected to the city sewer facility.
7. The pumphouse building containing a capped well and water-softening equipment; this building is along the southern border of the property and is kept locked at all times.
8. The capped well and associated plumbing; the well water use at this facility was discontinued because of perennial problems related to water softening process; the housing area is now served by water from the city of Palos Heights.
9. The hot air duct inside a house, showing no insulation and therefore free of asbestos-related materials.
10. The hot water pipes showing no insulation and therefore free of asbestos-related materials.
11. Tank used in the water softening process.
12. Electrical transformers mounted atop a utility pole; transformers are owned by the U.S. government.